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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/577,159	12/06/2006	Veronique Sousa	290297US2PCT	3058

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OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P.
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ALEXANDRIA, VA 22314

EXAMINER

ROLAND, CHRISTOPHER M

ART UNIT	PAPER NUMBER
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2893

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ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/577,159	Applicant(s) SOUSA ET AL.	
	Examiner Christopher M. Roland	Art Unit 2893	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 March 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 20-27 and 29-40 is/are pending in the application.
- 4a) Of the above claim(s) 26, 27, 30 and 34-38 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 20-25, 29, 31-33, 39 and 40 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of the Claims

1. Amendment filed 23 March 2010 is acknowledged. **Claim 20** has been amended. **Claim 40** has been added. **Claims 20-27 and 29-40** are pending. **Claims 26, 27, 30, and 34-38** remain withdrawn from consideration.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. **Claims 20-24, 29, 31-33, 39, and 40** are rejected under 35 U.S.C. 103(a) as being unpatentable over Holmberg (US Patent 4,177,475, hereinafter Holmberg '475) in view of Klersy et al. (US Patent 5,177,567, hereinafter Klersy '567), both of record.

With respect to claim 20, Holmberg '475 teaches (FIG. 3) a phase-change memory cell substantially as claimed, comprising:

between two electrical contacts (23 and 24), a portion in a memory material with an amorphous-crystalline phase-change and vice versa, as a stack (28-30) with an active central area (29) located between two passive outmost areas (28 and 30) (col. 5, ln. 7-58); and

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an interface between the active central area and each passive outmost area, each passive outmost area being made in a material having a melting temperature higher than that of the material of the active central area, the material of the passive outmost areas having very low solubility or zero solubility in the material of the active central area, the material of the passive outmost areas having at least one chemical element in common with the material of the active central area (col. 5, ln. 7-58).

Thus, Holmberg '475 is shown to teach all the features of the claim with the exception of wherein the interface being inert or quasi-inert from a physico-chemical point of view even during a writing operation of the phase-change memory cell.

However, Klersy '567 teaches (FIG. 4) inert barriers (1b and 5b) disposed between a threshold switching material (3) and electrodes (1a and 5a) to demonstrate long term highly stable electrical switching characteristics (col. 9, ln. 40 – col. 10, ln. 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed the passive outmost areas of Holmberg '475 of a material that forms an interface, inert or quasi-inert from a physico-chemical point of view even during a writing operation of the phase-change memory cell, between the active central area and each of said passive outmost areas as taught by Klersy '567 to demonstrate long term highly stable electrical switching characteristics.

Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. See *In re Leshin* (125 USPQ 416).

Note that the specification contains no disclosure of either the *critical nature of the claimed passive outmost areas being made in the same material* or any unexpected results arising therefrom. Where patentability is aid to based upon a particular chosen dimension or upon another variable recited in a claim, Applicant must show that the chosen dimension is critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

With respect to claim 21, Holmberg '475 teaches wherein each passive outmost area is made in a material having a thermal conductivity less than or equal to that of the material of the electrical contact which is closest to it (col. 5, ln. 7-58).

With respect to claim 22, Holmberg '475 teaches wherein the passive outmost areas have, in a crystalline phase, an electrical resistance less than or equal to that of the active central area in a crystalline phase (col. 5, ln. 7-58).

With respect to claim 23, Holmberg '475 teaches wherein each passive outmost area is made in a material promoting a phenomenon of formation of crystalline germs in the active central area in proximity to the interface (col. 5, ln. 7-58).

With respect to claim 24, Holmberg '475 teaches wherein each passive outmost area is made in a material substantially of the same chemical nature but with a different composition from those of the material of the active central area (col. 5, ln. 7-58).

With respect to claim 29, Holmberg '475 teaches further comprising an electrically insulating material (27), wherein the active central area is at least partially confined laterally by the electrically insulating material (col. 5, ln. 7-58).

With respect to claim 31, Holmberg '475 teaches wherein at least one of the passive outmost areas and the active central area coincide laterally (col. 5, ln. 7-58).

With respect to claim 32, Holmberg '475 teaches further comprising an electrically insulating material (27), wherein at least one of the passive outmost areas is bordered with the electrically insulating material (col. 5, ln. 7-58).

With respect to claim 33, Holmberg '475 and Klersy '567 teach a memory including a plurality of memory cells according to claim 20 as claimed (Holmberg '475, col. 5, ln. 7-58, Klersy '567, col. 9, ln. 40 – col. 10, ln. 3).

With respect to claim 39, Holmberg '475 teaches wherein each passive outmost area is made in a material having a thermal conductivity less than or equal to that of the material of the active central area (col. 5, ln. 7-58).

With respect to claim 40, Holmberg '475 teaches wherein
each interface is directly between the active central area and one of the two passive outmost areas (col. 5, ln. 7-58); and

the material of the active central area has undergone a phase change (col. 5, ln. 7-58).

3. **Claim 25** is rejected under 35 U.S.C. 103(a) as being unpatentable over Holmberg '475 and Klersy '567 as applied to claim 24 above, and further in view of

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Tanaka et al. (US Patent Application Publication 2004/0051161, hereinafter Tanaka '161) and Pertov et al. (US Patent 4,314,256, hereinafter Pertov '256), both of record.

With respect to claim 25, Holmberg '475 and Klersy '567 teach the device as described in claim 24 with the exception of the additional limitation wherein the material of the active central area includes between about 16% and 30% of tellurium and between about 84% and 70% of antimony, the material of each passive outmost area being antimony or antimony mixed with tellurium with a percentage ranging up to about 2%, these percentages being atomic percentages.

However, Tanaka '161 teaches a chalcogenide material (12) comprising between about 16% and 30% of tellurium and between about 84% and 70% of antimony ([0046]) as a recording layer in a non-volatile memory that can increase the possible number of data rewriting cycles while lowering power consumption ([0008]).

Further, Pertov '256 teaches a chalcogenide memory material having an art-recognized inert separation layer of, for example, antimony thereon to prevent the interaction of other layers with said chalcogenide memory material (col. 2, ln. 60 – col. 3, ln. 17).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed the active central area of Holmberg '475 and Klersy '567 comprising between about 16% and 30% of tellurium and between about 84% and 70% of antimony as taught by Tanaka '161 as a recording layer in a non-volatile memory that can increase the possible number of data rewriting cycles while lowering power consumption; and to have formed the passive outmost areas of

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Holmberg '475 and Klersy '567 comprising antimony or antimony mixed with tellurium with a percentage ranging up to about 2% as taught by Petrov '256 as an art-recognized inert interface material to prevent the interaction of other layers with said active central area.

Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. See *In re Leshin* (125 USPQ 416).

Within purview of one having ordinary skill in the art, it would have been obvious to determine the optimum concentrations of tellurium and antimony. See *In re Aller*, *Lacey*, and *Hall* (10 USPQ 233-237), "It is not inventive to discover optimum or workable ranges by routine."

Response to Arguments

4. Applicant's arguments filed 23 March 2010 have been fully considered but they are not persuasive.

Applicant argues (remarks, pp. 10-11) that during recording in Petrov '256, a local destruction of the separation layer (2) occurs as a result of an electric breakdown and therefore Petrov '256 teaches away from the newly presented limitation of claim 20, "wherein the interface being inert or quasi-inert from a physico-chemical point of view even during a writing operation of the phase-change memory cell." Examiner respectfully disagrees.

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Pertov '256 is not cited to address the newly presented limitation of independent claim 20. Klersy '567 of record is cited to address the aforementioned limitation. Pertov '256 is now cited only in the rejection of dependent claim 25 to demonstrate antimony as an art-recognized inert interface material for passive outmost areas.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Chen (US Patent Application Publication 2005/0051901);

Tran et al. (US Patent Application Publication 2005/0093092);

Chong et al. (US Patent Application Publication 2008/0001136); and

Sandoval et al. (US Patent Application Publication 2008/0042119) teach passive outmost areas comprising antimony.

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher M. Roland whose telephone number is 571-

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270-1271. The examiner can normally be reached on Monday-Friday, 8:00AM-5:00PM, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Davienne Monbleau can be reached on 571-272-1945. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/C. M. R./
Examiner, Art Unit 2893
/Leonardo Andújar/
Primary Examiner, Art Unit 2826